

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

William E. Webler

Application No.: 10/027,877

Filed: December 21, 2001

Title: **Method and Apparatus for Determining  
Injection Depth and Tissue Type**

Art Group: 3736

Examiner: Jonathan M. Foreman

**APPEAL BRIEF**

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Commissioner for Patents  
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Dear Members:

Appellant (hereinafter "Appellant") submits one copy of the following Appeal Brief pursuant to 37 C.F.R. § 1.192 for consideration by the Board of Patent Appeals and Interferences. Appellant also submits herewith a check in the amount of \$500.00 to cover the cost of filing the opening brief as required by 37 C.F.R. § 41.20(b)(2). Please charge any additional amount due or credit any overpayment to deposit Account No. 02-2666.

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**I. REAL PARTY IN INTEREST**

William E. Webler, the party named in the caption, assigned his rights to the invention disclosed in the subject application through an Assignment recorded on March 28, 2002, at reel and frame 012755/0405 to Advanced Cardiovascular Systems, Inc. On April 21, 2006, Abbott Vascular Inc. purchased the shares of Advanced Cardiovascular Systems, Inc. Therefore, Abbott Vascular, Inc. is the real party in interest.

**II. RELATED APPEALS AND INTERFERENCES**

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this Appeal.

**III. STATUS OF CLAIMS**

Claims 1, 3-20 and 26 are pending in the application. The Examiner has rejected claims 1, 3-20 and 26. Therefore, Appellant appeals the rejection of claims 1, 3-20 and 26.

**IV. STATUS OF AMENDMENTS**

An amendment and response to the Final Office Action dated May 23, 2006 was filed on June 29, 2006. On October 26, 2006, the Examiner issued an Advisory Action denying the entry of the amendments and denying allowance of any claim. Therefore, the appealed claims are as amended by the Amendment and Response to Office Action dated April 24, 2006.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

Embodiments described in the instant Application provide an apparatus for determining injection depth and/or tissue type based on the heat dissipation characteristics of body tissue. (App., p.2, lns. 9-11).

Independent claim 1 recites a needle 12 having dimensions suitable for insertion into a body. (App., FIGS. 1, 3-5). Representatively, needle 12, or elongate member 12 (hereinafter used interchangeably), can be designed for use with an intracardiac catheter to access a vascular

system, for use with an intravascular catheter to access a patient's vascular system, for percutaneous use, and for generally accessing blood-filled cavities and vessels. (App., p.4, lns. 9-15). Needle 12 includes a distal portion suitable for insertion into tissue 64, a distal opening 14, and a lumen extending from a proximal end to the distal opening 14. (App., FIGS. 1, 3-5). The lumen of needle 12 is in communication with distal opening 14 to allow a substance to be delivered through the lumen and out of opening 14. (App., p.4, lns. 1-2). Examples of substances that may be delivered include drugs, pharmaceutical agents, fluids, proteins, polypeptides, gene therapy material, cell therapy material, and deoxyribonucleic acid ("DNA"). (App., p.4, lns. 3-7). Independent claim 1 further recites a thermally conductive heating element 16 coupled to needle 12, wherein the heating element 16 comprises material whose electrical resistance changes in response to a change in temperature. (App., p.4, lns. 34-35; p.5, lns. 11-13). Representatively, heating element 16 may be constructed of tungsten or platinum wire or a thin metallic film. (App., p.5, lns. 15-17). Independent claim 1 further recites an interface, such as first and second electrically conductive leads 20 and 22, to a balanced circuit 28 having heating element 16 and a variable resistor 34 as resistive circuit elements. (App., p.9, lns. 10-13). Balanced circuit 28 measures a first differential resistance between heating element 16 and variable resistor 34 in response to a first condition and a second differential resistance in response to a second condition in circuitry to indicate a change of conditions related to a distance 26 of penetration of thermally conductive heating element 16 into tissue, e.g., artery wall 64. (App., p.15, lns. 18-28; p.16, lns. 3-26). Representatively, when needle 12 penetrates artery wall 64, heating element 16 will increase in temperature as it advances from the blood stream (first condition) through the artery wall (second condition) to a desired penetration depth 26. (App., p.16, lns. 3-26).

Dependent claim 3 depends from independent claim 1 and recites the limitation that needle 12 has an outer diameter between 0.009 inches and 0.134 inches. (App., p.4, lns. 28-30).

Dependent claim 4 depends from independent claim 1 and recites the limitation that needle 12 comprises at least one of stainless steel or ceramic. (App. p.8, lns. 8-11).

Dependent claim 5 depends from independent claim 1 and recites the limitation that elongate member 12 is a rod. (App., p.6, lns. 3-5).

Dependent claim 6 depends from independent claim 1 and recites the limitation that heating element 16 comprises at least one of a wire, a film and a thermistor material. (App, p.6, lns. 17-18).

Dependent claim 7 depends from independent claim 1 and recites the limitation that heating element 16 has a length which is approximately equal to or less than the thickness of tissue 64 in which at least a portion of elongate member 12 is to be inserted. (App., p.6, lns. 19-21).

Dependent claim 8 depends from dependent claim 7 and recites the limitation that the length of heating element 16 is between 0.010 inches and 0.400 inches. (App., p.9, lns. 7-10).

Dependent claim 9 depends from independent claim 1 and recites the limitation that the interface is an anemometry circuitry interface comprising first electrically conductive lead 20 coupled to a second end of heating element 16 and second electrically conductive lead 22 coupled to a second end of heating element 16. (App., p.5, lns. 23-27).

Dependent claim 10 depends from independent claim 1 and recites the limitation that a portion of elongate member 12 comprises an electrically conductive material. (App., p.8, lns. 17-18). Dependent claim 10 further recites that the interface comprises electrically conductive lead 20 coupled to a first end of heating element 16 and elongate member 12 electrically coupled to a second end of heating element 16. (App., p.8, lns. 17-23).

Independent claim 11 recites needle 12 having dimensions suitable for insertion into a body. (App., FIGS. 1, 3-5). Representatively, needle 12 can be designed for use with an intracardiac catheter to access a vascular system, for use with an intravascular catheter to access a patient's vascular system, for percutaneous use, and for generally accessing blood-filled cavities and vessels. (App., p.4, lns. 9-15). Needle 12 is capable of puncturing skin. (App., p.4, ln. 14). Independent claim 11 further recites thermally conductive heating element 16 coupled to a portion of needle 12. (App., p.4, lns. 34-35). Heating element 16 comprises material whose electrical resistance changes in response to a change in temperature. (App., p.5, lns. 11-13). Independent claim 11 further recites an interface to electrically couple anemometry circuit 28 to heating element 16 wherein the circuitry comprises a balanced circuit (App., p.10, lns. 17-23)

having heating element 16 and variable resistor 34 as resistive circuit elements. (App., p.9, lns. 31-34).

Dependent claim 12 depends from independent claim 11 and recites the limitation that needle 12 has an outer diameter between 0.009 inches and 0.134 inches. (App., p.4, lns. 28-30).

Dependent claim 13 depends from independent claim 11 and recites the limitation that needle 12 comprises at least one of stainless steel or ceramic. (App. p.8, lns. 8-11).

Dependent claim 14 depends from independent claim 11 and recites the limitation that anemometry circuit 28 is electrically coupled to heating element 16. (App., p.9, lns. 8-10). The circuitry of anemometry circuit 28 comprises a balanced circuit (App., p.10, lns. 17-23) having heating element 16 and variable resistor 34 as resistive circuit elements, wherein heating element 16 comprises at least one of a wire, a film and thermistor material. (App, p.6, lns. 17-18).

Dependent claim 15 depends from independent claim 11 and recites the limitation that heating element 16 has a length which is approximately equal to or less than the thickness of tissue 64 in which at least a portion of elongate member 12 is to be inserted. (App., p.6, lns. 19-21).

Dependent claim 16 depends from dependent claim 15 and recites the limitation that the length of heating element 16 is between 0.010 inches and 0.400 inches. (App., p.9, lns. 7-10).

Dependent claim 17 depends from dependent claim 14 and recites the limitation that the anemometry circuitry is electrically coupled to a first end of heating element 16 by first electrically conductive lead 20 and electrically coupled to a second end of heating element 16 by second electrically conductive lead 22. (App., p.5, lns. 23-27).

Dependent claim 18 depends from independent claim 14 and recites the limitation that a portion of elongate member 12 comprises an electrically conductive material. (App., p.8, lns. 17-18). Dependent claim 18 further recites that the anemometry circuitry is electrically coupled to a first end of heating element 16 by an electrically conductive lead 20 and is electrically coupled to a second end of heating element 16 by elongate member 12. (App., p.8, lns. 17-23).

Dependent claim 19 depends from dependent claim 14 and recites the limitation that the anemometry circuit comprises circuit 28 having heating element 16 and variable resistor 34 as resistive circuit elements. (App., p.9, lns. 31-34). Dependent claim 19 further recites amplifier 30 electrically coupled to circuit 28 (App., FIG. 2) to sense the difference in voltage drop across heating element 16 and variable resistor 34 caused by the difference between a first resistance of heating element 16 and a resistance of variable resistor 34 (App., p.10-11, lns. 32-35, ln. 1), to amplify the voltage difference (App., p.13, lns. 1-4) and to input the amplified voltage difference back to circuit 28 to cause a modification of a temperature of heating element 16 such that heating element 16 assumes a second resistance.

Dependent claim 20 depends from dependent claim 19 and recites the limitation that apparatus 10 further comprises additional heating element 17 wherein heating element 16 and additional heating element 16 are coupled along a length of elongate member 12. (App., p.17, lns. 29-30). Dependent claim 20 further recites that anemometry circuit separately coupled to each of heating element 16 and additional heating element 17 (App., p.17, lns. 26-29) such that heat dissipation characteristics measured by the plurality of anemometry circuits can be used to determine at least one of injection depth 26 and tissue type 64. (App., p.17, lns. 15-21).

Dependent claim 26 depends from independent claim 11 and recites the limitation that needle 12 has dimensions suitable for insertion into tissue 64 of the body (App., p.4, lns. 8-15). and balanced circuit 28 is configured to measure a distance of penetration of thermally conductive heating element 16 into tissue 64. (App., p.14, lns. 16-17).

## **VI. GROUND'S OF REJECTION TO BE REVIEWED ON APPEAL**

The issues involved in this Appeal are as follows:

A. Whether claims 1, 3, 5-9, 11, 12, 14-20 and 26 are obvious under 35 U.S.C. §103(a) over U.S. Patent No. 6,063,085 to Tay et al. ("*Tay*") in view of U.S. Patent No. 6,539,792 to Lull et al. ("*Lull*").

B. Whether claims 4 and 13 are obvious under 35 U.S.C. §103(a) over *Tay* in view of *Lull* in further view of U.S. Patent No. 3,470,604 to Zenick ("*Zenick*").



C. Whether claims 10 and 18 are obvious under 35 U.S.C. § 103(a) over *Tay* in view of *Lull* in further view of U.S. Patent No. 5,873,835 to Hastings et al. (“*Hastings*”).

All of the claims do not stand or fall together. The basis for the separate patentability of the claims is set forth below.

## **VII. ARGUMENT**

The Examiner rejects (i) claims 1, 3, 5-9, 11, 12, 14-20 and 26 under 35 U.S.C. § 103(a) as obvious over *Tay* in view of *Lull*; (ii) claims 4 and 13 as being obvious under 35 U.S.C. § 103(a) over *Tay* in view of *Lull* in further view of *Zenick*; and, (iii) claims 1 and 18 as being obvious under 35 U.S.C. § 103(a) over *Tay* in view of *Lull* in further view of *Hastings*. Appellant respectfully traverses these rejections for at least the following reasons.

### **A. Overview of the Prior Art**

#### **1. Overview of *Tay***

*Tay* describes an apparatus for closing and sealing a puncture at a puncture site in a vessel located beneath the skin using radio frequency or other energy to cauterize the puncture. (col. 2, lns. 45-47). The apparatus is connected to an energy supply such that heat is generated in, or thermally conducted to, the tissue, thereby thermally fusing the vascular tissue together. (Abstract). To aid in wound closure, *Tay* describes a flow anemometer to determine the depth of a vessel wall. (col. 20, lns. 43-45).

*Tay* does not teach or suggest a needle (capable of puncturing skin) with a distal opening wherein a distal portion of the needle is coupled to a thermally conductive heating element and wherein a balanced circuit having the heating element and a variable resistor as resistive circuit elements is associated with the needle. *Tay* does not teach or suggest a needle with an outer diameter of between 0.009 and 0.134 inches. *Tay* does not teach or suggest a heating element comprising a film or thermistor material. *Tay* does not teach or suggest a heating element between 0.010 inches and 0.400 inches. *Tay* does not teach or suggest a heating element that has a length that is approximately equal to or less than the thickness of a tissue in which at least a portion of the needle is to be inserted. *Tay* does not teach or suggest that an interface between the

balanced circuit and the heating element comprises a first electrically conductive lead electrically coupled to a first end of the heating element and a second electrically conductive lead electrically coupled to a second end of the heating element. *Tay* does not teach or suggest that an interface between the balanced circuit and the heating element comprises a first electrically conductive lead electrically coupled to a first end of the heating element and the needle coupled to a second end of the heating element. *Tay* does not teach or suggest an amplifier within the balanced circuit. *Tay* does not teach or suggest two heating elements coupled along a length of a needle wherein an anemometry circuit is separately coupled to each of the heating elements.

## **2. Overview of Lull**

*Lull* discloses a sensor that includes a first resistor, a second resistor, a first circuit, and a second circuit wherein the first and second resistors each has a resistance that varies in response to a change in a physical property. (Abstract). According to *Lull*, the sensor can be applied in semiconductor manufacturing processes and automotive applications. (col. 17. lns. 1-5).

*Lull* does not teach or suggest a needle (capable of puncturing skin) with a distal opening wherein a distal portion of the needle is coupled to a thermally conductive heating element and wherein a balanced circuit having the heating element and a variable resistor as resistive circuit elements is associated with the needle. *Lull* does not teach or suggest a needle with an outer diameter of between 0.009 and 0.134 inches. *Lull* does not teach or suggest a heating element comprising a film or thermistor material. *Lull* does not teach or suggest a heating element between 0.010 inches and 0.400 inches. *Lull* does not teach or suggest a heating element which has a length which is approximately equal to or less than the thickness of a tissue in which at least a portion of the needle is to be inserted. *Lull* does not teach or suggest that an interface between the balanced circuit and the heating element comprises a first electrically conductive lead electrically coupled to a first end of the heating element and the needle coupled to a second end of the heating element. *Lull* does not teach or suggest two heating elements coupled along a length of a needle wherein an anemometry circuit is separately coupled to each of the heating elements.

### 3. Overview of Zenick

*Zenick* describes a method of producing a hypodermic needle assembly. (Abstract). After the butt-end of the needle is notched, the butt-end is press-fitted into an undersized bore of a thermoplastic hub. (*Id.*).

*Zenick* does not teach or suggest a needle (capable of puncturing skin) with a distal opening wherein a distal portion of the needle is coupled to a thermally conductive heating element and wherein a balanced circuit having the heating element and a variable resistor as resistive circuit elements is associated with the needle. *Zenick* does not teach or suggest a needle with an outer diameter of between 0.009 and 0.134 inches. *Zenick* does not teach or suggest a heating element comprising a film or thermistor material. *Zenick* does not teach or suggest a heating element between 0.010 inches and 0.400 inches. *Zenick* does not teach or suggest a heating element that has a length that is approximately equal to or less than the thickness of a tissue in which at least a portion of the needle is to be inserted. *Zenick* does not teach or suggest that an interface between the balanced circuit and the heating element comprises a first electrically conductive lead electrically coupled to a first end of the heating element and a second electrically conductive lead electrically coupled to a second end of the heating element. *Zenick* does not teach or suggest that an interface between the balanced circuit and the heating element comprises a first electrically conductive lead electrically coupled to a first end of the heating element and the needle coupled to a second end of the heating element. *Zenick* does not teach or suggest an amplifier within the balanced circuit. *Zenick* does not teach or suggest two heating elements coupled along a length of a needle wherein an anemometry circuit is separately coupled to each of the heating elements.

### 4. Overview of Hastings

*Hastings* describes an intravascular device which measures blood pressure and blood flow. (col. 2, lns. 19-20). The intravascular device includes an elongate shaft with a pressure transducer and a flow transducer connected to the distal end of the elongate shaft. (col. 2, lns. 20-22). The pressure transducer may include a column of ferrofluid which moves in response to changes in intravascular blood pressure. (col. 2, lns. 23-25). The pressure transducer may also include an electrically conductive coil surrounding the ferrofluid such that movement of the

ferrofluid causes a change in inductance in the coil. (col. 2, lns. 25-28). The coil may be electrically coupled to an external measurement circuit which measures inductance of the coil as the ferrofluid moves in response to changes in intravascular blood pressure. (col. 2, lns. 28-31). The coil may also be supplied with an electrical current to heat the coil to a temperature above body temperature. (col. 2, lns. 31-33). The measurement circuit may then measure resistance of the coil as the resistance of the coil changes in response to intravascular blood flow. (col. 2, lns. 33-35). The measurement circuit may measure resistance and inductance simultaneously by utilizing such methods as frequency separation, phasic separation and computational analysis. (col. 2, lns. 35-38).

*Hastings* does not teach or suggest a needle (capable of puncturing skin) with a distal opening wherein a distal portion of the needle is coupled to a thermally conductive heating element and wherein a balanced circuit having the heating element and a variable resistor as resistive circuit elements is associated with the needle. *Hastings* does not teach or suggest a needle with an outer diameter of between 0.009 and 0.134 inches. *Hastings* does not teach or suggest a heating element comprising a film or thermistor material. *Hastings* does not teach or suggest a heating element between 0.010 inches and 0.400 inches. *Hastings* does not teach or suggest a heating element that has a length that is approximately equal to or less than the thickness of a tissue in which at least a portion of the needle is to be inserted. *Hastings* does not teach or suggest that an interface between the balanced circuit and the heating element comprises a first electrically conductive lead electrically coupled to a first end of the heating element and a second electrically conductive lead electrically coupled to a second end of the heating element. *Hastings* does not teach or suggest that an interface between the balanced circuit and the heating element comprises a first electrically conductive lead electrically coupled to a first end of the heating element and the needle coupled to a second end of the heating element. *Hastings* does not teach or suggest an amplifier within the balanced circuit. *Hastings* does not teach or suggest two heating elements coupled along a length of a needle wherein an anemometry circuit is separately coupled to each of the heating elements.

**B. Rejection of Claims 1, 3, 5-9, 11-12, 14-20, 26 Under 35 U.S.C. § 103 as Made Obvious over *Tay* in view of *Lull***

In order to establish a *prima facie* case of obviousness: (1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference; (2) there must be a reasonable expectation of success; and (3) the references when combined must teach or suggest all of the claim limitations. MPEP 2142.

Appellant submits that independent claims 1 and 11 are patentable over *Tay* in view of *Lull* for at least the reason that none of the cited references either singly or combined provide the suggestion or motivation to modify the references to arrive at the inventions embodied in claims 1 and 11. More particularly, (a) *Tay* and *Lull* do not suggest the desirability of their combination, (b) there is no objective reason to combine the teaching of the *Tay* and *Lull*, and (c) *Tay* and *Lull* are improperly combined because *Tay* teaches away from claims 1 and 11.

In making a determination for obviousness, the following factual inquiries must be made: (1) determining the scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims at issue; (3) resolving the level of ordinary skill in the pertinent art; and (4) evaluating evidence of secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

**1. *Tay* and *Lull* do not suggest the desirability of their combination**

Independent claims 1 and 11 are patentable over *Tay* in view of *Lull* because the cited references do not suggest the desirability of their combination. The mere fact that the references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. MPEP 2143.01(III). Independent claim 1 is directed to “a needle coupled to a thermally conductive heating element, wherein the heating element is coupled to a balanced circuit which measures a first differential resistance between the heating element and a variable resistor in response to a first condition and second differential resistance in response to a second condition to indicate a change of conditions related to a distance of penetration of the heating element into a tissue.” (App., claim 1). Independent claim 11 is directed to “a needle coupled to a thermally conductive heating element, wherein the

heating element is coupled to a balanced circuit having two resistive circuit elements.” (App., claim 11). According to the Application, balanced circuit 28 is capable of measuring heat dissipation characteristics of a tissue environment in which heating element 16 is disposed. (*see* App., p.2, lns. 9-10). Thus, independent claims 1 and 11 contemplate an apparatus for determining injection depth and/or tissue type based on the heat dissipation characteristics of body tissue. (*see* App., p.2, lns. 9-11).

In contrast, *Tay* discloses an apparatus for closing and sealing a puncture at a puncture site in a vessel located beneath the skin using radio frequency or other energy to cauterize the puncture. (col. 2, lns. 45-47). The closing or sealing of a puncture is directly opposite to the function of a needle. Therefore, *Tay* teaches away from claim 1. *Lull* discloses a sensor that includes a first resistor, a second resistor, a first circuit, and a second circuit wherein the first and second resistors each has a resistance that varies in response to a change in a physical property. (Abstract). According to *Lull*, the sensor can be applied in semiconductor manufacturing processes and automotive applications. (col. 17, lns. 1-5). There is no suggestion in the cited references that it is desirable to combine a sensor which, according to *Lull*, can be used in semiconductor manufacturing processes and automotive applications with a vessel cauterizing medical device, as taught by *Tay*. The statement made by the Examiner that it would have been obvious to modify *Tay* in view of *Lull* “in order to compare variations in the resistance of the heating element” is merely a characteristic of the sensor described in *Lull*, and is not a proper motivation to combine the cited references. (Final Office Action dated May 23, 2006 (“May 23 Final Office Action”), p.3-4).

**2. There is no objective reason to combine the teaching of the *Tay* and *Lull***

Moreover, independent claims 1 and 11 are patentable over *Tay* in view of *Lull* because there is no objective reason to combine the teachings of the cited references. The fact that a claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient by itself to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. MPEP 2143.01(IV). In response to Applicant’s arguments included in the Office Action dated January 24, 2006 (“January 24 Office Action”) that a proper motivation to combine the cited references was not set forth, the Examiner states: “*Tay et al.* fails

to disclose any specific circuitry to control the anemometer. As a result, one having ordinary skill in the art would look towards the prior art for a circuit to control an anemometer.” (May 23 Office Action, p.6). The Examiner has provided no objective reason to combine *Tay* with *Lull*, but has merely made a generic statement that “one having ordinary skill in the art would look towards the prior art for a circuit to control an anemometer.” (*Id.*). Under well established patent law, however, the Examiner is required to present “**evidence**, preferably in the form of some teaching, suggestion, incentive or inference in the applied prior art . . . that one having ordinary skill in the art *would have been led* to combine the relevant teachings of the applied references in the proposed manner to arrive at the claimed invention.” *Ex parte Levengood*, 28 U.S.P.Q.2d 1300, 1301 (Bd. Pat. App. & Inter. 1993); *see also In re Kotzab*, 217 F.3d 1365, 1318 (Fed. Cir. 2000) (in reversing the Board’s finding of obviousness, the Court stated “there was no finding as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of [Appellant]’s invention to make the combination in the manner claimed”). The Examiner has not met his burden in providing a proper motivation to combine the cited references.

3. **Tay and Lull are improperly combined because Tay teaches away from claims 1 and 11**

Furthermore, independent claims 1 and 11 are patentable over *Tay* in view of *Lull* because *Tay* teaches away from the claims and, therefore, the Examiner has improperly combined the references. MPEP 2145(X)(D). A prior art reference must be considered in its entirety including portions that lead away from the claimed invention. MPEP 2141.02(VI). Independent claim 1 includes the limitation of “a needle having . . . a distal portion suitable for **insertion** into tissue . . . and a lumen extending from a proximal end to the distal opening and in communication with the distal opening to allow a substance to be delivered through the lumen and out of the opening.” (App., claim 1). Independent claim 11 includes the limitation of “a needle having dimensions suitable for insertion into a body, and having a distal end capable of **puncturing** skin.” (App., claim 11). Needle 12 in claims 1 and 11 is, therefore, either inserted into or punctures artery wall 64 to deliver a substance thereto. (*see* App., p.4, Ins. 1-7). “Puncture” is defined as making a hole or perforation by piercing or perforating. (*see* Exh. A). By contrast, the cautery apparatus in *Tay* is designed to **seal** an already existing puncture wound in a

vessel. (col. 5, lns. 10-62). Representatively, *Tay* discloses that the “present invention effects the hemostatic ***closure*** of a percutaneous or other type of puncture, incision or opening in a body vessel.” (col. 5, lns. 45-57, emphasis added). Combining *Tay* with *Lull* is improper because the disclosures in the references are unlikely to be productive of the result sought by Appellant. *See In re Gurley*, 31 U.S.P.Q.2d 1130, 1131 (Fed. Cir.1994) (“in general, a reference will teach away if it suggests that the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant”). That is, the vessel cauterizing medical device of *Tay* combined with the anemometry circuit of *Lull* is unlikely to perform as a needle inserted into or puncturing artery wall 64 to deliver a substance thereto. (*see App.*, p.4, lns. 1-7). Thus, *Tay* cannot be combined with *Lull* because the cited references teach away from independent claims 1 and 11 and therefore their combination by the Examiner was improper.

#### 4. Conclusion

Dependent claims 3, 5-9 depend on independent claim 1 and therefore include all of the limitations claim 1. Dependent claim 12, 14-17, 19-20 and 26 depend on independent claim 11 and therefore includes all of the limitations of claim 11. Accordingly, for at least these reasons, claims 1, 3, 5-9, 11-12, 14-17, 19-20 and 26 are separately patentable over *Tay* in view of *Lull*. Appellant respectfully requests reconsideration and that the rejection of 1, 3, 5-9, 11-12, 14-17, 19-20 and 26 under 35 U.S.C. § 103(a) be overturned.

#### C. Rejection of Claim 3, 12 Under 35 U.S.C. § 103 as Made Obvious over *Tay* in view of *Lull*

Claims 3 and 12 depend from claims 1 and 11, respectively, and therefore incorporate the limitations of claims 1 and 11. As discussed above in the traversal of claims 1 and 11 as being made obvious by *Tay* in view of *Lull*, the references may not be combined for at least the reason that none of the cited references either singly or combined provide the suggestion or motivation to combine the references to arrive at the inventions embodied in claims 1 and 11. Thus, for at least these reasons, claims 3 and 12 are separately patentable over *Tay* in view of *Lull*.

Claims 3 and 12 are separately patentable over *Tay* in view of *Lull* because the references when combined do not include the limitation of “a ***needle*** having . . . an outer diameter between 0.009 inches and 0.134 inches.” (*App.*, claims 3, 12). According to the Application, needle 12



allows a substance to be delivered through the lumen and out of opening 14. (*see* App., p.4, lns. 1-2). By contrast, port 184 of elongate member 182 in *Tay* (which is not a needle, but rather a depth finding or guiding device (col. 17, lns. 45-46)) allows “blood [to] enter the port 184 and flow through lumen 183” wherein “[t]he depth of the vascular puncture from the surface of the skin can then be noted.” (col. 18, lns. 22-25). *Lull* does not describe a needle at all, but is instead only directed to anemometry circuitry. (Abstract).

Accordingly, for at least these reasons, claims 3 and 12 are separately patentable over *Tay* in view of *Lull*. Appellant respectfully requests reconsideration and that the rejection of claims 3 and 12 under 35 U.S.C. § 103(a) be overturned.

**D. Rejection of Claims 6 and 14 Under 35 U.S.C. § 103 as Made Obvious over *Tay* in view of *Lull***

Claims 6 and 14 depend from claims 1 and 11, respectively, and therefore incorporate the limitations of claims 1 and 11. As discussed above in the traversal of claims 1 and 11 as being made obvious by *Tay* in view of *Lull*, the references may not be combined for at least the reason that none of the cited references either singly or combined provide the suggestion or motivation to combine the references to arrive at the inventions embodied in claims 1 and 11. Thus, for at least these reasons, claims 6 and 14 are separately patentable over *Tay* in view of *Lull*.

Claims 6 and 14 are further separately patentable over *Tay* in view of *Lull* because the references when combined do not include the limitation that “the heating element comprises at least one of a wire, a film, and a thermistor material.” (App., claims 6, 14). According to the Application, heating element 16 may be tungsten or platinum wire, a thin metallic film or a thermistor. (App., p.5, lns. 16-20). *Tay* and *Lull* are completely lacking of any teaching or suggestion of a heating element consisting of a thin metallic film or a thermistor.

Accordingly, for at least these reasons, claims 6 and 14 are separately patentable over *Tay* in view of *Lull*. Appellant respectfully requests reconsideration and that the rejection of claims 6 and 14 under 35 U.S.C. § 103(a) be overturned.

**E. Rejection of Claims 7, 15 Under 35 U.S.C. § 103 as Made Obvious over *Tay* in view of *Lull***

Claims 7 and 15 depend from claims 1 and 11, respectively, and therefore incorporate the limitations of claims 1 and 11. As discussed above in the traversal of claims 1 and 11 as being made obvious by *Tay* in view of *Lull*, the references may not be combined for at least the reason that none of the cited references either singly or combined provide the suggestion or motivation to combine the references to arrive at the inventions embodied in claims 1 and 11. Thus, at least for these reasons, claims 7 and 15 are separately patentable over *Tay* in view of *Lull*.

Claims 7 and 15 are further separately patentable over *Tay* in view of *Lull* because the references when combined do not include the limitation that “heating element has a length which is approximately equal to or less than the thickness of tissue in which at least a portion of elongate member is to be inserted.” (App., claims 7, 15). Representatively, heating element 16 has a length that is approximately equal to or less than the known thickness of a targeted tissue 64 (accounting for the tissue penetration angle of device 10) whose heat dissipation characteristics are to be measured by device 10, which allows device 10 to be able to more discretely measure heat dissipation characteristics and detect differences in such characteristics compared to embodiments with heating elements which are longer and, therefore, have no penetration depth at which heating element 16 is surrounded by only the targeted tissue. (App., p.6, lns. 19-29). *Tay* and *Lull* are completely lacking of any such teaching or suggestion.

Furthermore, that the limitations in claims 7 and 15 are completely absent in the cited references is apparent in the Examiner’s unsupported statement for which he provides no citation: “[t]he heating element is less than the thickness of the tissue in which it is inserted.” (May 23 Office Action). The Examiner has not met his burden in rejecting claims 7 and 15.

Accordingly, for at least these reasons, claims 7 and 15 are separately patentable over *Tay* in view of *Lull*. Appellant respectfully requests reconsideration and that the rejection of claims 7 and 15 under 35 U.S.C. § 103(a) be overturned.

**F. Rejection of Claims 8, 16 Under 35 U.S.C. § 103 as Made Obvious over *Tay* in view of *Lull***

Claims 8 and 16 depend from claims 1 and 11, respectively, and therefore incorporate the limitations of claims 1 and 11. As discussed above in the traversal of claims 1 and 11 as being made obvious by *Tay* in view of *Lull*, the references may not be combined for at least the reason that none of the cited references either singly or combined provide the suggestion or motivation to combine the references to arrive at the inventions embodied in claims 1 and 11. Thus, for at least these reasons, claims 8 and 16 are separately patentable over *Tay* in view of *Lull*.

Claims 8 and 16 are further separately patentable over *Tay* in view of *Lull* because the references when combined do not include the limitation that “the length of the heating element is between 0.010 inches and 0.400 inches.” (App., claims 8, 16). According to the Application, heating element 16 has a preferred length between 0.010 inches and 0.400 inches. (App., p.5, lns. 7-9). Representatively, heating element 16 has a length that is approximately equal to or less than the known thickness of a targeted tissue 64 (accounting for the tissue penetration angle of device 10) whose heat dissipation characteristics are to be measured by device 10, which allows device 10 to be able to more discretely measure heat dissipation characteristics and detect differences in such characteristics compared to embodiments with heating elements which are longer and, therefore, have no penetration depth at which heating element 16 is surrounded by only the targeted tissue. (App., p.6, lns. 19-29). *Tay* and *Lull* are completely lacking of any such teaching or suggestion.

Accordingly, for at least these reasons, claims 8 and 16 are separately patentable over *Tay* in view of *Lull*. Appellant respectfully requests reconsideration and that the rejection of claims 8 and 16 under 35 U.S.C. § 103(a) be overturned.

**G. Rejection of Claims 9, 17 Under 35 U.S.C. § 103 as Made Obvious over *Tay* in view of *Lull***

Claims 9 and 17 depend from claims 1 and 11, respectively, and therefore incorporate the limitations of claims 1 and 11. As discussed above in the traversal of claims 1 and 11 as being made obvious by *Tay* in view of *Lull*, the references may not be combined for at least the reason that none of the cited references either singly or combined provide the suggestion or motivation

to combine the references to arrive at the inventions embodied in claims 1 and 11. Thus, for at least these reasons, claims 9 and 17 are separately patentable over *Tay* in view of *Lull*.

Claims 9 and 17 are further separately patentable over *Tay* in view of *Lull* because the references when combined do not include the limitation of “a first electrically conductive lead electrically coupled to a first end of the heating element; and a second electrically conductive lead electrically coupled to a second end of the heating element.” (App., claims 8, 17). The Examiner apparently recognizes the lack of explicit teaching or suggestion of this limitation in the cited references as indicated by his statement that “[i]n order to operate the device as disclosed by *Tay et al.* (sic) must include a first and second lead coupled to the at least one heating element.” (May 23 Office Action, p.3). The Examiner appears to be relying on a theory of inherency to make his rejection of claims 9 and 17; however, in relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” MPEP 2112(IV). The Examiner has not met his burden in his rejection of these claims.

Accordingly, for at least these reasons, claims 9 and 17 are separately patentable over *Tay* in view of *Lull*. Appellant respectfully requests reconsideration and that the rejection of claims 9 and 17 under 35 U.S.C. § 103(a) be overturned.

**H. Rejection of Claims 4, 13 Under 35 U.S.C. § 103 as Made Obvious over *Tay* in view of *Lull* in further view of *Zenick***

Claims 4 and 13 depend from claims 1 and 11, respectively, and therefore incorporate the limitations of claims 1 and 11. As discussed above in the traversal of claims 1 and 11 as being made obvious by *Tay* in view of *Lull*, the references may not be combined for at least the reason that none of the cited references either singly or combined provide the suggestion or motivation to combine the references to arrive at the inventions embodied in claims 1 and 11. Thus, for at least these reasons, claims 4 and 13 are separately patentable over *Tay* in view of *Lull*.

Claims 4 and 13 are further separately patentable over *Tay* in view of *Lull* in further view of *Zenick* because none of the references teach or suggest that the needle comprises ceramic. (App., claims 4, 13). According to the Application, ceramic needles advantageously increase

response time and sensitivity of heating element 16 due to the reduced thermal mass and thermal conductivity of ceramic. (App., p.8, Ins. 11-14). *Tay*, *Lull* and *Zenick* are completely lacking of any such teaching or suggestion.

Accordingly, for at least these reasons, claims 4 and 13 are separately patentable over *Tay* in view of *Lull*. Appellant respectfully requests reconsideration and that the rejection of claims 4 and 13 under 35 U.S.C. § 103(a) be overturned.

**I. Rejection of Claims 10, 18 Under 35 U.S.C. § 103 as Made Obvious over *Tay* in view of *Lull* in further view of *Hastings***

Claims 10 and 18 depend from claims 1 and 11, respectively, and therefore incorporate the limitations of claims 1 and 11. As discussed above in the traversal of claims 1 and 11 as being made obvious by *Tay* in view of *Lull*, the references may not be combined for at least the reason that none of the cited references either singly or combined provide the suggestion or motivation to combine the references to arrive at the inventions embodied in claims 1 and 11. Thus, for at least these reasons, claims 10 and 18 are separately patentable over *Tay* in view of *Lull*.

Claims 10 and 18 are further separately patentable over *Tay* in view of *Lull* in further view of *Hastings* because none of the references teach or suggest the limitation of “an electrically conductive lead electrically coupled to a first end of the heating element, and the elongate member electrically coupled to a second end of the heating element.” (App., claims 10, 18). Representatively, in embodiments in which a portion of needle 12 is electrically conductive, heating element 16 can be connected to anemometry circuitry by (i) first electrically conductive lead 20 electrically coupled to a first end of heating element 16 and (ii) a conductive portion of needle 12 coupled to a second end of heating element 16. (App., p.8, Ins. 17-23). Unlike *Hastings*, claims 10 and 18 do not contemplate “two leads”, but rather an electrical coupling of a first lead 20 with heating element 16 and an electrical coupling of a conductive portion of needle 12 with heating element 16. (*Id.*). The Examiner relies on *Hastings* for this so-called teaching; however, *Hastings* only describes “[o]ne lead 221 of the sensor coil 230 . . . electrically connected to the plated surface of the wire core 220 while the *other lead 223* extend[ing] from the proximal end of the guide wire 214,” i.e., two lead 221 and 223. (col. 11, Ins. 41-43,

emphasis added). Thus, none of the cited references teach or suggest all of the claim limitations of claims 10 and 18.

Accordingly, for at least these reasons, claims 10 and 18 are separately patentable over *Tay* in view of *Lull*. Appellant respectfully requests reconsideration and that the rejection of claims 4 and 13 under 35 U.S.C. § 103(a) be overturned.

**J. Rejection of Claim 19 Under 35 U.S.C. § 103 as Made Obvious over *Tay* in view of *Lull***

Claim 19 depends from claim 11 and therefore incorporate the limitations of claim 11. As discussed above in the traversal of claim 11 as being made obvious by *Tay* in view of *Lull*, the references may not be combined for at least the reason that none of the cited references either singly or combined provide the suggestion or motivation to combine the references to arrive at the inventions embodied in claim 11. Thus, for at least these reasons, claim 19 is separately patentable over *Tay* in view of *Lull*.

Claim 19 is further separately patentable over *Tay* in view of *Lull* because none of the references teach or suggest the limitation of:

an amplifier electrically coupled to the circuit, to sense the difference in voltage drop across the heating element and the variable resistor caused by the difference between a first resistance of the heating element and a resistance of the variable resistor, to amplify the voltage difference, and to input the amplified voltage difference back to the circuit to cause a modification of a temperature of the heating element such that the heating element assumes a second resistance.

(App., claim 19). Representatively, amplifier 30 is electrically coupled to bridge circuit 28 to sense the difference in voltage drop across heating element 16 and variable resistor 34 caused by the difference between the resistance of heating element 16 and the resistance of variable resistor 34. Amplifier 30 receives power from positive  $V_{supply}$  and is also coupled to ground. Amplifier 30 compares the voltages of positive input 46 and negative input 48. If positive input 46 is a higher voltage than negative input 48, the positive difference between input 46 and input 48 is amplified and output through line 50. (App., pp.10-11, lns. 32-35, 1-7). By contrast, operational amplifier 51 in *Lull* is designed to generate current. (col. 6, lns. 44-45). *Tay* does not include any

description of an amplifier. Thus, none of the cited references teach or suggest all of the claim limitations of claim 19.

Accordingly, for at least these reasons, claim 19 is separately patentable over *Tay* in view of *Lull*. Appellant respectfully requests reconsideration and that the rejection of claim 19 under 35 U.S.C. § 103(a) be overturned.

**K. Rejection of Claim 20 Under 35 U.S.C. § 103 as Made Obvious over *Tay* in view of *Lull***

Claim 20 depends from claim 11 and therefore incorporate the limitations of claim 11. As discussed above in the traversal of claim 11 as being made obvious by *Tay* in view of *Lull*, the references may not be combined for at least the reason that none of the cited references either singly or combined provide the suggestion or motivation to combine the references to arrive at the inventions embodied in claim 11. Thus, for at least these reasons, claim 20 is separately patentable over *Tay* in view of *Lull*.

Claim 20 is further separately patentable over *Tay* in view of *Lull* because none of the references teach or suggest the limitation of “anemometry circuitry separately coupled to each of the heating element and the additional heating element such that the heat dissipation characteristics measured by the plurality of anemometry circuits can be used to determine at least one of injection depth and tissue type.” (App., claim 20). By contrast, *Lull* discloses that:

embodiments of the present invention use ***a common circuit*** to set one of the upstream and downstream coils to a predetermined temperature or to a predetermined temperature above ambient, and then supply an amount of current to the other of the upstream and downstream coils to force the resistance, and thus, the temperature, of the upstream and downstream coils to be equal.

(col. 6, lns. 6-12). *Tay* does not include any description of an amplifier. Thus, none of the cited references teach or suggest all of the claim limitations of claim 20.

Accordingly, for at least these reasons, claim 20 is separately patentable over *Tay* in view of *Lull*. Appellant respectfully requests reconsideration and that the rejection of claim 20 under 35 U.S.C. § 103(a) be overturned.

### **VIII. CONCLUSION AND RELIEF**

Accordingly, it is submitted that the rejections of claims 1, 3-20, and 26 based on 35 U.S.C. § 103 be overturned.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR, & ZAFMAN LLP


Dated: January 9, 2007

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#### **CERTIFICATE OF TRANSMISSION**

I hereby certify that this correspondence is being submitted electronically via EFS Web to the United States Patent and Trademark Office on January 9, 2007.

  
Si Vuong



## **IX. CLAIMS APPENDIX**

The claims involved in this Appeal are as follows:

1. (Previously Presented) An apparatus comprising:  
a needle having dimensions suitable for insertion into a body, a distal portion suitable for insertion into tissue, a distal opening, and a lumen extending from a proximal end to the distal opening and in communication with the distal opening to allow a substance to be delivered through the lumen and out of the opening;  
a thermally conductive heating element coupled to the distal portion of the elongate member, the heating element comprising material whose electrical resistance changes in response to a change in temperature; and  
an interface to a balanced circuit having the heating element and a variable resistor as resistive circuit elements, wherein the balanced circuit measures a first differential resistance between the heating element and the variable resistor in response to a first condition and a second differential resistance in response to a second condition in circuitry to indicate a change of conditions related to a distance of penetration of the thermally conductive heating element into a tissue.
2. (Canceled.)
3. (Previously Presented) The apparatus of Claim 2, wherein the needle has an outer diameter between 0.009 inches and 0.134 inches.
4. (Previously Presented) The apparatus of Claim 2, wherein the needle comprises a material of at least one of stainless steel and ceramic.
5. (Original) The apparatus of Claim 1, wherein the elongate member is a rod.
6. (Original) The apparatus of Claim 1, wherein the heating element comprises at least one of a wire, a film, and a thermistor material.
7. (Previously Presented) The apparatus of Claim 1, wherein the heating element has a length which is approximately equal to or less than the thickness of a tissue in to which at least a portion of the elongate member is to be inserted.

8. (Original) The apparatus of Claim 7, wherein the length of the heating element is between 0.010 inches and 0.400 inches.

9. (Previously Presented) The apparatus of Claim 1, wherein the interface is an anemometry circuitry interface comprising:

a first electrically conductive lead electrically coupled to a first end of the heating element; and

a second electrically conductive lead electrically coupled to a second end of the heating element.

10. (Previously Presented) The apparatus of Claim 1, wherein a portion of the elongate member comprises an electrically conductive material and wherein the interface comprises:

an electrically conductive lead electrically coupled to a first end of the heating element, and

the elongated member electrically coupled to a second end of the heating element.

11. (Previously Presented) An apparatus comprising:

a needle having dimensions suitable for insertion into a body, and having a distal end capable of puncturing skin;

a thermally conductive heating element coupled to a portion of the needle, the heating element comprising material whose electrical resistance changes in response to a change in temperature; and

an interface to electrically couple an anemometry circuitry to the heating element, wherein the circuitry comprises a balanced circuit having the heating element and a variable resistor as resistive circuit elements.

12. (Original) The apparatus of Claim 11, wherein the needle has an outer diameter between 0.009 inches and 0.134 inches.

13. (Original) The apparatus of Claim 11, wherein the needle comprises a material of at least one of stainless steel and ceramic.

14. (Previously Presented) The apparatus of Claim 11, further comprising anemometry circuitry electrically coupled to the heating element wherein the circuitry comprises a balanced circuit having a heating element and a variable resistor as resistive circuit elements, wherein the heating element comprises at least one of a wire, a film, and a thermistor material.

15. (Previously Presented) The apparatus of Claim 11, wherein the heating element has a length which is approximately equal to or less than the thickness of a tissue in to which at least a portion of the needle is to be inserted.

16. (Original) The apparatus of Claim 15, wherein the length of the heating element is between 0.010 inches and 0.400 inches.

17. (Previously Presented) The apparatus of Claim 14, wherein the anemometry circuitry is electrically coupled to a first end of the heating element by a first electrically conductive lead and is electrically coupled to a second end of the heating element by a second electrically conductive lead.

18. (Previously Presented) The apparatus of Claim 14, wherein a portion of the elongate member comprises an electrically conductive material and wherein the anemometry circuitry is electrically coupled to a first end of the heating element by an electrically conductive lead and is electrically coupled to a second end of the heating element by the elongate member.

19. (Previously Presented) The apparatus of Claim 14, wherein the anemometry circuitry comprises:

a circuit having the heating element and a variable resistor as resistive circuit elements;  
and

an amplifier electrically coupled to the circuit

to sense the difference in voltage drop across the heating element and the variable resistor caused by the difference between a first resistance of the heating element and a resistance of the variable resistor,

to amplify the voltage difference, and

to input the amplified voltage difference back to the circuit to cause a modification of a temperature of the heating element such that the heating element assumes a second resistance.

20. (Previously Presented) The apparatus of Claim 19, further comprising an additional heating element wherein the heating element and the additional heating element are coupled along a length of the elongate member, and further comprising:

anemometry circuitry separately coupled to each of the heating element and the additional heating element such that the heat dissipation characteristics measured by the plurality of anemometry circuits can be used to determine at least one of injection depth and tissue type.

21-25. (Canceled.)

26. (Previously Presented) The apparatus of Claim 11 wherein the needle has dimensions suitable for insertion into a tissue of the body and the balanced circuit is configured to measure a distance of penetration of the thermally conductive heating element into the tissue.

**X. EVIDENCE APPENDIX**

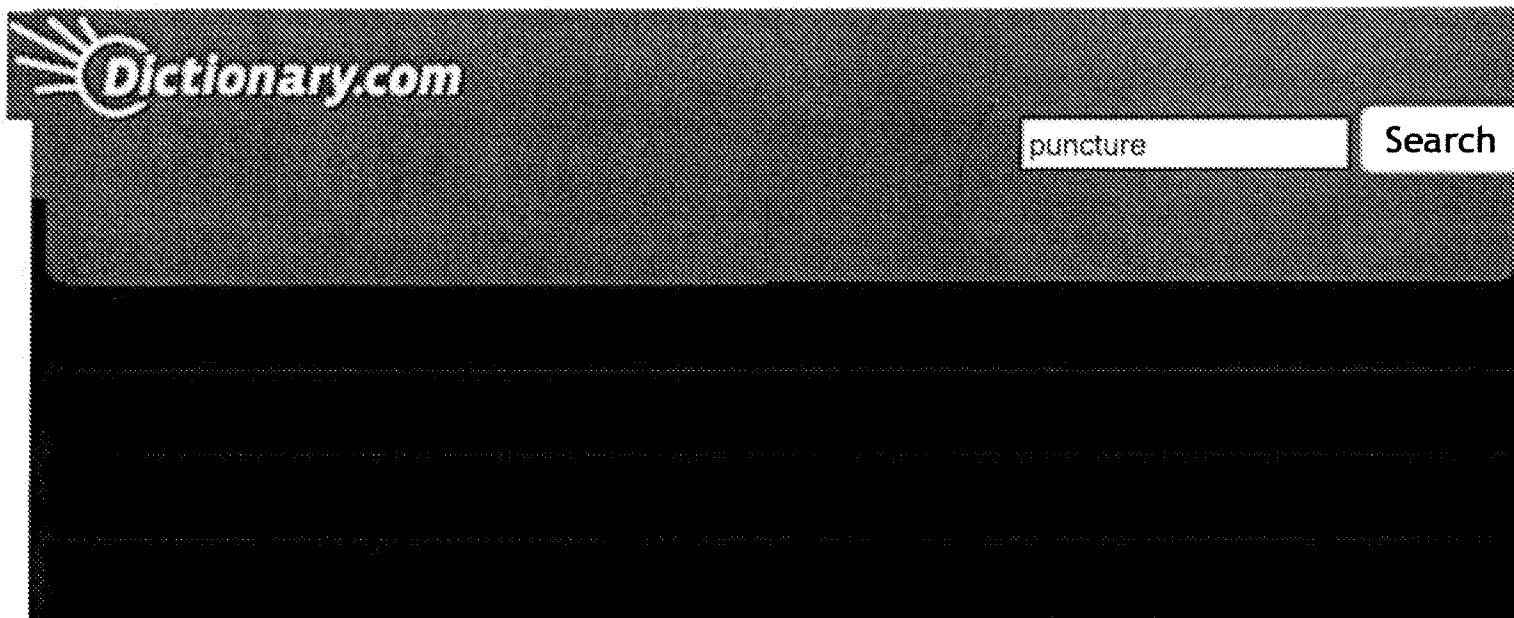
**A. Exhibit A**

Appellant respectfully submits herewith a document entitled “Puncture” available at <http://dictionary.reference.com/search?q=puncture> (last visited, December 22, 2006) as Exhibit A. Exhibit A is a common definition of “puncture” and is being submitted as a courtesy to the Board.

**XI. RELATED PROCEEDINGS APPENDIX**

Not Applicable.

# **EXHIBIT A**



Advertisement

### Top Web Results for "puncture"

## 9 results for: *puncture*

View results from: [Dictionary](#) | [Thesaurus](#) | [Encyclopedia](#) | [All Reference](#) | [the Web](#)

[Dictionary.com Unabridged \(v 1.1\)](#) - [Cite This Source](#)

punc·ture   [puhngk-cher] [Pronunciation Key](#) noun, verb, -tured, -tur·ing.

-noun

1. the act of piercing or perforating, as with a pointed instrument or object.
2. a hole or mark so made.
3. Zoology. a small pointlike depression.

-verb (used with object)

4. to pierce or perforate, as with a pointed instrument: to puncture leather with an awl.
5. to make (a hole, perforation, etc.) by piercing or perforating: He punctured a row of holes in the cardboard.
6. to make a puncture in: A piece of glass punctured the tire.
7. to reduce or diminish as if by piercing; damage; wound: to puncture a person's pride.



8. to cause to collapse or disintegrate; spoil; ruin: to puncture one's dream of success.

-verb (used without object)

9. to become punctured: These tires do not puncture easily.

[Origin: 1350-1400; ME < L p nct ra a pricking, equiv. to p nct(us) (ptp. of pungere to pierce; see pungent), + -ra -ure]

—Related forms

punc·tur·a·ble, adjective

punc·ture·less, adjective



punc·tur·er, noun

—Synonyms 2. break, rupture, perforation.

Dictionary.com Unabridged (v 1.1)

Based on the Random House Unabridged Dictionary, © Random House, Inc. 2006.

[American Heritage Dictionary](#) – [Cite This Source](#)

punc·ture (p ngk'ch r) [Pronunciation Key](#)  

v. punc·tured, punc·tur·ing, punc·tures

v. tr.

1. To pierce with a pointed object.
2. To make (a hole) by piercing.
3. To cause to collapse by piercing.
4. To depreciate or deflate: cutting remarks that punctured my ego.

v. intr.

To be pierced or punctured.

n.

1. The act or an instance of puncturing.
2. A hole or depression made by a sharp object, especially a hole in an automotive tire.

[From Middle English, a pricking, from Late Latin pūctūra, from pūctus, past participle of pungere, to prick; see peuk- in Indo-European roots.]

punc'tur·a·ble adj.

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The American Heritage® Dictionary of the English Language, Fourth Edition

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[WordNet - Cite This Source](#)

puncture

noun

1. loss of air pressure in a tire when a hole is made by some sharp object
2. a small hole made by a sharp object
3. the act of puncturing or perforating

verb

1. pierce with a pointed object; make a hole into; "puncture a tire"
2. make by piercing; "puncture a hole"
3. reduce or lessen the size or importance of; "The bad review of his work deflated his self-confidence" [syn: [deflate](#)]
4. cause to lose air pressure or collapse by piercing; "puncture an air balloon"
5. be pierced or punctured; "The tire punctured"

WordNet® 2.1, © 2005 Princeton University

[American Heritage Stedman's Medical Dictionary - Cite This Source](#)

punc·ture (pŭngk'chər)

v. **punc-tured, punc-tur-ing, punc-tures**

To pierce with a pointed object, as with a needle.

n.

A hole or depression made by a sharp object. Also called centesis.

The American Heritage® Stedman's Medical Dictionary

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[Merriam-Webster's Medical Dictionary - Cite This Source](#)

Main Entry: <sup>1</sup>punc·ture

Pronunciation: 'p&[ng] (k) -ch&r

Function: noun

- 1 : an act of puncturing
- 2 : a hole, wound, or perforation made by puncturing

Merriam-Webster's Medical Dictionary, © 2002 Merriam-Webster, Inc.

Merriam-Webster's Medical Dictionary – Cite This Source

Main Entry: <sup>2</sup>puncture

Function: verb

Inflected Forms: punc·tured; punc·tur·ing / 'p&[ng] (k) -ch&-ri [ng] , 'p&[ng] (k) -shri [ng] /

transitive senses

: to pierce with or as if with a pointed instrument or object <puncture the skin with a needle> puncture intransitive senses

: to become punctured

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On-line Medical Dictionary – Cite This Source

puncture

puncture: in CancerWEB's On-line Medical Dictionary

On-line Medical Dictionary, © 1997-98 Academic Medical Publishing & CancerWEB

Kernerman English Multilingual Dictionary (Beta Version) – Cite This Source

puncture [ pa ʔkt ɹerb

to make or get a small hole in

Example: Some glass on the road punctured my new tyre.

Arabic:

Japanese:パンクする

Chinese (Simplified): 刺穿

Korean: ...에 (조그만) 구멍을 뚫다, (타이어를) 펑크내다

Chinese (Traditional): 刺穿

Czech: (pro)píchnout

Latvian: izdurt (caurumu); p r durt

Danish: punktere

Lithuanian: pradurti, prakiurti, prakiurdinti

Dutch: lek maken, \*raken

Norwegian: stikke hull i, punktere

Estonian: läbi torkama

Polish: przedziurawi

Finnish: puhkaista

Portuguese (Brazil): furar

French: crever

Portuguese (Portugal): fazer um furo

German: durchstechen

Romanian: a în epa

Greek: τρουν

Russian: прокалывать получить прокол

Hungarian: kilyukaszt

Icelandic: stinga gat á; fá gat á

Indonesian: menusuk

Italian: bucare, forare

Slovak: prepichnú

Slovenian: prebosti (se)

Spanish: pinchar

Swedish: punktera

Turkish: delik açmak, patlatmak

puncture [ pa kt ʃən]

a hole in a tyre

Example: My car has had two punctures this week.

Arabic:

Chinese (Simplified): ( 胎的 ) 刺孔

Chinese (Traditional): (車胎的)刺孔

Czech: (pro)píchnutí

Danish: punktering

Dutch: lekke band

Estonian: torkeauk

Finnish: rengasrikko

French: crevaison

German: das Loch

Greek: τρ πα στο λ στχο

Hungarian: gumidefekt

Icelandic: það að springa

Indonesian: lubang

Italian: foratura, bucatura

Japanese:パンク

Korean: (타이어의) 펑크, 구멍

Latvian: d riens; caurums

Lithuanian: prad rimas, pradurta skyl

Norwegian: punktering

Polish: przebicie

Portuguese (Brazil): furo

Portuguese (Portugal): furo

Romanian: pan de cauciuc

Russian: прокол

Slovak: defekt

Slovenian: luknja

Spanish: pinchazo

Swedish: punktering

Turkish: ufak delik, patlak

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